

REMARKS

Claims 52 and 53 are currently amended. Claim 51 is canceled. Reconsideration of the application is requested in light of the amendments above and remarks below. Entry of this amendment is proper because it places the case in better condition for appeal.

I. The rejection of claim 51 under 35 U.S.C. 112

Claim 51 is canceled. Accordingly any rejection relating to this claim is moot.

II. The objection to claims 52 and 53.

Claims 52 and 53 are currently amended. Reconsideration is urged.

III. The rejection of claim 54 under 35 U.S.C. 112 (enablement).

Claim 54 stands rejected under 35 U.S.C. 112 because the specification, while being enabled for a bacterial host cell including at least one copy of a gene of interest, allegedly does not reasonably provide enablement where the gene of interest encodes the claimed genus of enzymes. Applicants traverse this rejection.

It is well settled that "[t]he first paragraph of section 112 requires nothing more than objective enablement. How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is of no importance." *In re Marzocchi*, 169 U.S.P.Q. 367, 369 (C.C.P.A. 1971). Moreover, "a specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as in compliance with the enabling requirement of the first paragraph of section 112 unless there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support." *In re Marzocchi*, 169 U.S.P.Q. at 369.

"The determination of what constitutes undue experimentation in a given case requires the application of a standard of reasonableness, having due regard for the nature of the invention and the state of the art ... The test is not quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed to enable the determination of how to practice a desired embodiment of the invention claimed ..." *Ex parte Jackson*, 217 U.S.P.Q. 804 (Bd. Pat. App. 1982).

It is also well settled that an assertion by the Patent Office that the enabling disclosure is not commensurate in scope with the protection sought must be supported by evidence or

reasoning substantiating the doubts so expressed. *In re Dinh-Nguyen*, 181 U.S.P.Q. 46 (C.C.P.A. 1974). See also *U.S. v. Telectronics*, 8 U.S.P.Q.2d 1217 (Fed. Cir. 1988); *In re Bowen*, 181 U.S.P.Q. 48 (C.C.P.A. 1974); *Ex parte Hitzeman*, 9 U.S.P.Q.2d 1821 (BPAI 1988).

Factors to be considered in determining whether a disclosure would require undue experimentation include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims. *In re Wands*, 8 U.S.P.Q.2d 1400, 1404 (Fed. Cir. 1988).

Applicants submit that the specification enables claim 54 where the gene of interest encodes a genus of enzymes. More specifically, claim 54 provides that the gene of interest encodes an enzyme with an activity selected from the group consisting of aminopeptidase, amylase, amyloglucosidase, carbohydrase, carboxypeptidase, catalase, cellulase, chitinase, cutinase, cyclodextrin glycosyltransferase, deoxyribonuclease, esterase, galactosidase, beta-galactosidase, glucoamylase, glucose oxidase, glucosidase, haloperoxidase, hemicellulase, invertase, isomerase, laccase, ligase, lipase, lyase, mannosidase, oxidase, pectinase, peroxidase, phytase, phenoloxidase, polyphenoloxidase, protease, ribonuclease, transferase, transglutaminase, or xylanase. The genes of interest encoding an enzyme are structurally similar because they are made of DNA, and it would be routine for persons of ordinary skill in the art to select and/or include DNA encoding a desired enzyme, including an enzyme from claim 54.

Further, the specification contains an extensive disclosure of how to produce the bacterial host cell in accordance with the present disclosure including a gene of interest encoding the specified enzyme(s). For example, the specification includes: a detailed description providing, *inter alia*, information on the choice of a host cell; instruction on integration by homologous recombination; preferred embodiment(s) relating to the cell of the invention, wherein the gene of interest encodes an enzyme. See e.g., the Detailed Description pages 13-15. The Example section of the disclosure (pages 20-26) specifically provides suitable strains and donor organisms, plasmids, pCLO1154 encoding, *inter alia*, the lacZ gene from E.coli., propagation of PL1801 strain for LacZ determination, specific instruction on general molecular biology methods (see page 22), suitable media (page 22), an assay for β -galactosidase activity (page 23), instruction on the deletion of *metE* in *B subtilis*, amplification plasmids, amplification experiments, including measurement of β -galactosidase enzyme (page 26). The example section discloses a gene of

interest encodes an enzyme e.g. β -galactosidase. Accordingly, the present disclosure fully instructs one of skill in the art how to make and use the claimed invention.

However, without any reasonable scientific reasoning, the Office concludes that genes of interest encoding the genus of enzymes in claim 54 are not enabled. The specification provides a working example of a gene of interest encoding β -galactosidase. The level of knowledge and skill in the art is such that skilled artisans are aware of, and capable of, including other genes of interest suitable for encoding an enzyme with each activity set out in claim 54. In fact, inclusion of other genes of interest is routine in the art. The office has provided no evidence to the contrary.

This evidence establishes that the specification enables the claimed invention without undue experimentation. Application of the *Wands* factors to these facts further supports the conclusion that the claims are enabled. First, the present invention is in the field of molecular biology. The *Wands* court has already held that the level of skill in this art is high. *Wands*, 858 F.2d at 740. Second, the specification provides an extensive disclosure for producing the claimed bacterium including a gene of interest encoding the enzymes of claim 54. Third, similar to *Wands*, the methods of making the claimed bacterium including manipulating the gene of interest encoding a desired enzyme are known in the art and described in the specification. Fourth, the specification provides working examples of an encoded enzyme within the scope of the claims i.e. β -galactosidase. Fifth, given the extensive guidance in the specification and the high level of skill in the art, the experimentation involved to encode other enzymes within the scope of the claims is routine and well within the skill of those in the art. As held by the *Wands* court, "The test is not merely quantitative since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experiment should proceed." *Id.* at 737.

Applicants draw the Examiner's attention to *In re Angstadt*, 190 U.S.P.Q. 214 (C.C.P.A. 1976). In *Angstadt*, the claimed process of preparing hydroperoxides used a metal salt complex as a catalyst. The specification disclosed catalysts that worked and some that gave little or no yield of hydroperoxides. The claims were rejected for lack of enablement, specifically as requiring undue experimentation to find useful catalysts. This rejection was reversed by the CCPA.

In holding that the claims did satisfy 35 USC 112, the Court observed, 190 U.S.P.Q. at 218:

We cannot agree with the board that appellants' disclosure is not sufficient to enable one of ordinary skill in the art to practice the invention without undue experimentation. We note that many chemical processes, and catalytic processes particularly, are unpredictable, [citation omitted] and that the scope of enablement varies inversely with the degree of unpredictability involved, [citation omitted]. That this particular process is unpredictable is demonstrated further by appellants in their specification. Appellants have disclosed forty examples; one of these examples yields no hydroperoxides in the final product. Also, appellants have expressly indicated in their specification that some of these organometallic complex catalysts 'yield *** no hydroperoxides in the final product.'

Appellants have apparently not disclosed every catalyst which will work; they have apparently not disclosed every catalyst which will not work. The question, then, is whether in an unpredictable art, section 112 requires disclosure of a test with every species covered by a claim. To require such a complete disclosure would apparently necessitate a patent application or applications with 'thousands' of catalysts along with information as to whether each exhibits catalytic behavior resulting in the production of hydroperoxides. More importantly, such a requirement would force an inventor seeking adequate patent protection to carry out a prohibitive number of actual experiments. This would tend to discourage inventors from filing patent applications in an unpredictable area since the patent claims would have to be limited to those embodiments which are expressly disclosed. A potential infringer could readily avoid 'literal' infringement of such claims by merely finding another analogous catalyst complex which could be used in 'forming hydroperoxides.'

This admonition applies with equal force to the present disclosure, which sufficiently describes the claimed invention and omits what is well known or routine in the art. To require more would fly in the face of the *Angstadt* holding.

The Court, 190 USPQ at 218, recognized that some experimentation might be necessary for the skilled worker to select non-exemplified catalysts for use:

Appellants have, in effect, provided those skilled in this art with a large but finite list of transition metal salts from which to choose in preparing such a complex catalyst. Appellants have actually carried out 40 runs using various transition metal salts and hexaalkylphosphoramides. If one skilled in this art wished to make and use a transition metal salt other than those disclosed in appellants' 40 runs, he would merely read appellants' specification for directions how to make and use the catalyst complex to oxidize the alkylaromatic hydrocarbons, and could then determine whether hydroperoxides are, in fact, formed. The process discovered by appellants is not complicated, and there is no indication that special equipment or unusual reaction conditions must be provided when practicing the invention. One skilled in this art would merely have to substitute the correct mass of a transition metal salt for the transition metal salts disclosed in appellants' 40 runs. Thus, we have no basis for concluding that persons skilled in this art, armed with the specification and its 40 working examples, would not easily be able to determine which catalyst complexes within the scope of the claims work to produce hydroperoxides and which do not.

However, while some experimentation might be necessary, as long as the experimentation was not "undue experimentation," the claims would not violate 35 USC 112, *Angstadt, Id.*:

Since appellants have supplied the list of catalysts and have taught how to make and how to use them, we believe that the experimentation required to determine which catalysts will produce hydroperoxides would not be undue and certainly would not 'require ingenuity beyond that to be expected of one of ordinary skill in the art.' (Emphasis added).

The present application discloses, *inter alia*, a list of enzymes with specified activities, and a working example of an expressed enzyme. While some experimentation might be necessary create other non-exemplified enzymes, such experimentation "would not be undue and certainly would not 'require ingenuity beyond that expected of one of ordinary skill in the art.'" (*Angstadt*, 190 U.S.P.Q. at 218). Certainly, there is no evidence of record to the contrary.

Finally, the Examiner has not provided any evidence that one skilled in the art would not be able to include other genes of interest encoding the genus of enzymes set forth in claim 54. Indeed, one of ordinary skill in the art would easily be able to include a gene of interest encoding an enzyme with a desired activity.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 112. Applicants respectfully request reconsideration and withdrawal of the rejection.

IV. Conclusion

In view of the above, it is respectfully submitted that all claims are in condition for allowance. Early action to that end is respectfully requested. The Examiner is hereby invited to contact the undersigned by telephone if there are any questions concerning this amendment or application.

Should any additional fees be due the USPTO is authorized to charge the deposit account of Novozymes North America, Inc. *i.e.* Deposit Account No. 50-1701.

Respectfully submitted,

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